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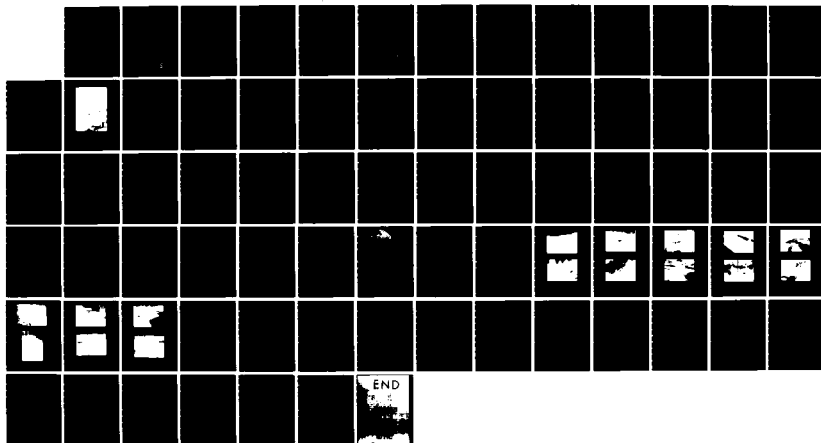
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
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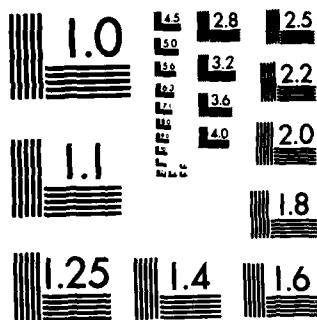
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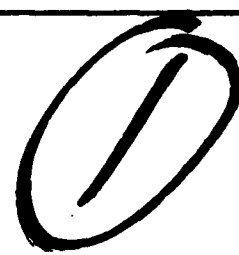
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AD-A144 592

CONNECTICUT RIVER BASIN
ESSEX, CONNECTICUT



**COMSTOCK POND DAM
CT 00424**

**PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM**

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Connecticut River Basin Essex, Connecticut		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Comstock Pond Dam is an earth fill dam with vertical stone masonry walls along the upstream and downstream faces. The dam has a total length of 540 feet, a maximum height of 8 feet, and a crest width of 16 feet. The visual inspection revealed that the dam is in fair condition. The maximum storage at Comstock Pond Dam is 57-acre feet with water at the top of dam, which according to Corps Guidelines classifies it as a small da. Based upon the high hazard potential to downstream property owners and in accordance with the Corps Guidelines, the test flood is equal to $\frac{1}{2}$ the Probable Maximum Flood.		



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

NEDED

JUL 16 1981

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Comstock Pond Dam (CT-00424) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis.

The preliminary hydrologic analysis indicated that the spillway capacity for the Comstock Pond Dam would likely be exceeded by floods greater than 9 percent of the Probable Maximum Flood (PMF). Our screening criteria specifies that a dam classified as high hazard with a spillway capacity insufficient to discharge fifty percent of the PMF be judged as having a seriously inadequate spillway. As a result, this dam is assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The term "unsafe" applied to a dam because of an inadequate spillway does not indicate the same degree of emergency as that term would if applied because of structural deficiency. It does indicate, however, that a severe storm may cause overtopping and possible failure of the dam, with significant damage and potential loss of life downstream.

We recommend that within twelve months from the date of this report the owner of the dam engage the services of a qualified registered engineer to determine further the potential of overtopping the dam and the need for and the means to increase project discharge capacity. Based on this determination, appropriate remedial mitigating measures should be designed and completed within 24 months of this date of notification. In the interim a detailed emergency operation plan and warning system should be promptly developed and round-the-clock surveillance should be provided during periods of heavy precipitation or high project discharge.

NEDED

Honorable William A. O'Neill

I approve the report and support the findings and recommendations described in Section 7, with qualifications as noted above. I request that you keep me informed of the actions taken to implement these recommendations since this follow-up is an important part of the program.

Copies of this report have been forwarded to the Department of Environmental Protection and to the owner, Pratt Read Corporation, Ivoryton, CT 06442. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Protection for your cooperation in this program.

Sincerely,

A handwritten signature in dark ink, appearing to read "C. E. Edgar, III". The signature is stylized with a large, sweeping "C" and "E", and the name "Edgar" is written in a cursive script. The Roman numeral "III" is written in a simple, blocky font at the end of the signature.

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

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COMSTOCK POND DAM

CT 00424

CONNECTICUT RIVER BASIN

ESSEX, CONNECTICUT

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Phase I Inspection Report
National Dam Inspection Program

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NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No. : CT 00424
Name of Dam : Comstock Pond Dam
Town : Essex
County and State : Middlesex County, Connecticut
Stream : Tributary to Falls River
Date of Inspection: November 25, 1980

BRIEF ASSESSMENT

Comstock Pond Dam is an earth fill dam with vertical stone masonry walls along the upstream and downstream faces. A 25 foot long concrete spillway is located near the middle of the dam and it is bordered by masonry training walls. The downstream spillway channel consists of a 48-inch culvert under Main Street followed by a natural channel with stone walls. The dam has a total length of 540 feet, a maximum height of 8 feet, and a crest width of 16 feet.

The dam has a 10 foot by 10 foot wooden platform outlet structure. This platform houses 2 drop screens, 3 gate valve shafts and a 4-inch fire drawoff pipe. The gate valves control a 15-inch outlet pipe which emerges just downstream of the spillway, and two separate pipes which supply service water to the Pratt Read Corporation.

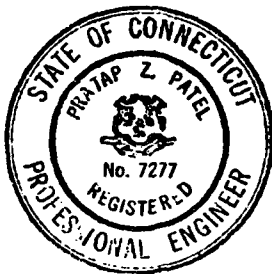
The visual inspection revealed that the dam is in fair condition. The upstream stone masonry wall and cap have deteriorated and collapsed in a number of locations. There is an area of erosion and sloughing along the upstream face beyond Station 3+90 in the direction of the left abutment. The ground is soggy at a point approximately 20 feet to the right of the right edge of the spillway. There is some seepage occurring through the downstream wall near the right edge of the spillway.

The maximum storage at Comstock Pond Dam is 57-acre feet with water at the top of dam, which according to Corps Guidelines classifies it as a small dam. Based upon the high hazard potential to downstream property owners and in accordance with the Corps Guidelines, the test flood is equal to 1/2 the Probable Maximum Flood. The peak inflow to the pond is 1140 cfs and the peak outflow is 1075 cfs. The spillway with

water at the top of the dam is capable of passing 186 cfs or 17 percent of the test flood outflow. The test flood will overtop the dam by 0.9 feet.

In accordance with the results of the visual inspection along with the hydrologic and hydraulic analysis of Comstock Pond Dam additional engineering analysis and construction is required. Specifically this would include investigating the seepage through the downstream wall and the cause of the wet, soggy spot adjacent to the toe of the downstream masonry wall. In addition, the loose and displaced blocks in the upstream masonry wall should be replaced or reset. Areas of erosion and sloughing along the upstream wall should be repaired and protected from future erosion by the placement of engineered riprap. A more detailed hydrologic and hydraulics study should be completed to assess further the potential of overtopping the dam and the need for and means to increase project discharge capacity.

The recommendations and remedial measures are described in Section 7 and should be addressed within one year after receipt of this Phase I Inspection Report by the owner.



Pratap Z. Patel, P.E.
Project Manager

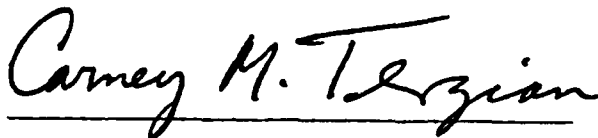
Pratap Z. Patel

Philip W. Genovese & Associates, Inc.
Hamden, Connecticut

This Phase I Inspection Report on Comstock Pond Dam (CT-00424) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.



ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

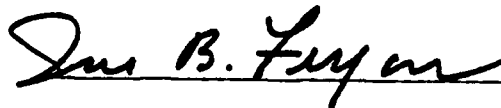


CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division



JOSEPH W. FINEGAN, JR., CHAIRMAN
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:



JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at

some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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U.S. ARMY ENGINEER DIV.
NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

PHILIP W. GENOVESE AND
ASSOCIATES, INC.
ENGINEERS - HAMDEN, CT.

NATIONAL
PROGRAM
OF
INSPECTION
OF
NON-FED
DAMS

OVERVIEW PHOTO

DECEMBER, 1980

COMSTOCK POND DAM

FALLS RIVER

ESSEX,

CONNECTICUT

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
COMSTOCK POND DAM - CT 00424

SECTION I
PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Philip W. Genovese and Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in South Central Connecticut. Authorization and notice to proceed were issued to Philip W. Genovese and Associates, Inc. under a letter of November 17, 1980 from Colonel William E. Hodgson Jr., Corps of Engineers. Contract No. DACW 33-81-C-0017 has been assigned by the Corps of Engineers for this work.

b. Purpose

1. Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.
2. Encourage and prepare the states to initiate quickly effective dam safety programs for non-federal dams.
3. Update, verify, and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

Comstock Pond Dam is located in the Town of Essex in Middlesex County, Connecticut. The pond is in the Ivoryton section of Essex north of Route 144, a short distance east of the intersection of Route 144 and Bushy Hill Road. The dam impounds the waters of a tributary to Falls River, and is shown on the Essex Connecticut Quadrangle with the approximate coordinates of North $41^{\circ}20.7'$, West $72^{\circ}27.2'$. The dam is approximately 4 miles above the confluence with the Connecticut River.

b. Description of Dam and Appurtenances

Comstock Pond Dam is an earthen dam with a dry rubble masonry face on both the upstream and downstream sides. The total length of the dam is 540 feet, which includes a 25 foot long concrete spillway. The dam has a maximum height of 8 feet and average width of 16 feet. There is a 10 foot by 10 foot wooden platform which houses two drop screens and three gate valve shafts which control a 15-inch outlet pipe along with an 8-inch and a 12-inch water supply pipe for the Pratt Read Corporation. In addition there is a 4-inch cast iron suction pipe crossing the platform which may be used by the fire department to draw off water. The downstream channel is bounded by hand placed stone walls and is lined with cobbles and boulders. It passes through a 48-inch culvert under Route 144.

c. Size Classification

The dam's maximum impoundment of 57 acre-feet and height of 8 feet places it in the SMALL size category, using as a reference the size classification table in the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams. Table 1 of these guidelines classifies a dam with 50-1000 acre-feet of storage as being small in size.

d. Hazard Classification

The hazard potential classification for this dam is HIGH using the Corps Guidelines, because there is a residence in addition to the Pratt Read plant near the dam on Route 144 where economic loss could be great. Also, a dam breach would wash out a section of Route 144 and threaten a number of residences downstream near the center of Ivoryton, with the possibility of loss of more than a few human lives.

e. Ownership

The dam is owned by Pratt Read Corporation, Ivoryton, Connecticut 06442, telephone 203-767-8282.

f. Operator

The operation of the dam is controlled by Pratt Read Corporation, the official in charge being Mr. Gilbert Nicholls, P.E., who may be reached at the plant through a phone call to 203-767-8282.

g. Purpose of the Dam

The purpose of the dam is for water supply for the Pratt Read manufacturing plant.

h. Design and Construction History

No plans could be found relating to the design or construction of this dam. The only information available indicates that the dam was built around 1874 for the former Comstock Cheney Company of Essex. Comstock Cheney was later brought out by the dam's present owner, the Pratt Read Corporation.

Three letters in the files of the State of Connecticut Board of Supervision of Dams pertain to Comstock Pond Dam. These letters, written in 1955 and 1956, indicate that certain repairs and improvements were made to Comstock Pond Dam at that time, including paving of the spillway apron with concrete, building a stone wall with a concrete cap the entire length of the dam, placing earth fill in back of the wall and seeding. Copies of these letters are included in Appendix B.

i. Normal Operational Procedures

The normal operational procedures for the dam include the drawoff of approximately 20,000 gallons per day for various service water purposes at the Pratt Read Corporation. In addition, Mr. Nicholls stated that the 15 inch conduit gate is opened if there is advance warning of potential heavy precipitation.

1.3 Pertinent Data

a. Drainage Area

The drainage area for this dam covers 1.06 square miles, or 678 acres. Most of this area is sparsely populated, heavily wooded rural area, with a range of elevations of 110 to 350 NGVD. About 0.69 square miles of this area is tributary to another upstream dam of the Pratt Read Corporation, Bushy Hill Dam. This dam was previously inspected under the Corps Phase I Inspection Program and found to be in fair condition. A Phase II inspection is scheduled to begin within 2 months.

b. Discharge at Damsite

1. The outlet works consist of an 8-inch pipe, invert elevation unknown; a 12-inch pipe, invert elevation unknown; and a 15-inch pipe at invert elevation 100.9, and with a discharge capacity of 35 cfs.
2. The maximum flood at damsite is not known.

3. The ungated spillway capacity at the top of dam is 185 cfs at an elevation of 111.0.
4. The ungated spillway capacity at test flood is 330 cfs at elevation 111.9.
5. The gated spillway capacity at normal pool elevation is not applicable.
6. The gated spillway capacity at test flood elevation is not applicable.
7. The total spillway capacity at test flood elevation of 111.9 is 330 cfs.
8. The total project discharge at top of dam elevation of 111.0 is 220 cfs.
9. The total project discharge at test flood elevation of 111.9 is 1080 cfs.

c. Elevation (Feet above NGVD)

1.	Streambed at centerline of dam	103.3
2.	Bottom of cutoff	Not known
3.	Maximum tailwater	N/A
4.	Normal pool	109.0
5.	Full flood control pool	N/A
6.	Spillway crest	109.0
7.	Design surcharge	N/A
8.	Top of dam	111.0
9.	Test flood surcharge	111.9

d. Reservoir (Length in feet)

1.	Test flood pool	900
2.	Normal pool	850
3.	Flood control pool	N/A
4.	Spillway crest pool	850
5.	Top of dam	885

e. Storage (Acre-feet)

1.	Normal pool	42.3
2.	Spillway crest pool	42.3
3.	Flood control pool	N/A
4.	Top of dam	57.4
5.	Test flood pool	67.5

f. Reservoir Surface (Acres)

1.	Normal pool	5.5
2.	Flood control pool	N/A
3.	Spillway crest pool	5.5
4.	Test flood pool	9.5
5.	Top of dam	9.2

g. Dam

- | | |
|---------------------------------|---|
| 1. Type..... | Earthen, with rubble masonry face, upstream and downstream. |
| 2. Length..... | 540 feet |
| 3. Height..... | 8 feet |
| 4. Top width..... | 16 feet |
| 5. Side slopes - Upstream | Vertical |
| - Downstream | Vertical |
| 6. Zoning | Unknown |
| 7. Impervious core | Unknown |
| 8. Cutoff | Unknown |
| 9. Grout curtain | Unknown |

h. Diversion and Regulating Tunnel

None

i. Spillway

- | | |
|-----------------------------|---|
| 1. Type | Concrete |
| 2. Length of weir..... | 25 feet |
| 3. Crest elevation..... | 109.0 |
| 4. Gates | N/A |
| 5. Upstream channel | N/A |
| 6. Downstream channel | Cobbles and boulders
with stone walls. |

j. Regulating Outlets

1. Inverts 100.9 (15-inch pipe)
Unknown (8-inch and 12-inch pipe)
2. Size 15-inch
12-inch
8-inch
3. Description The capacity of the 15-inch outlet with water at the top of the dam is 34 cfs. The 8-inch and 12-inch pipes supply service water to the Pratt Read plant. Their capacity is not known.
4. Control Mechanism All of the outlet pipes are controlled by gate valves on the wooden platform outlet structure.

SECTION 2
ENGINEERING DATA

2.1 Design Data

This dam was constructed in 1874 for industrial water uses. No in-depth engineering data were found.

2.2 Construction Data

No construction records were available for use in evaluating the dam.

2.3 Operation Data

No engineering operational data were disclosed.

2.4 Evaluation of Data

a. Availability

No engineering data is available.

b. Adequacy

The lack of in-depth engineering data did not allow for a definitive review. Therefore, the condition of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Validity

Non-Applicable.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General

Comstock Pond Dam was inspected on November 25, 1980. Members of the inspection team included personnel from Philip W. Genovese and Associates, Inc. and Geotechnical Engineers, Inc. Subsequent discussions were held with Mr. Nicholls of Pratt Read Corporation to clarify operational procedures for the dam.

b. Dam

The dam has vertical stone masonry walls along the upstream and downstream faces with an earth fill between the walls. An overflow spillway structure exists near the middle of the dam.

At the time of the inspection, the water level was about one inch above the spillway crest.

The crest is grass covered and well maintained. There is evidence of numerous small animal tunnels along the crest of the dam. Depressions up to 4 feet wide and 6 to 8 inches deep were noted adjacent to the left and right spillway wing walls and adjacent to the downstream wall at about Sta. 0+40. The upstream face is comprised of a dry stone masonry wall in which various portions have been repointed in the past. To the right of the spillway structure, the masonry wall is capped with a slush concrete veneer coating which is generally in good shape except as noted. Approximately 100 feet from the contact with the right abutment, a 3 inch wide separation has occurred in the concrete approximately 3 feet back from the upstream edge of the wall. The rule could be extended one foot into this depression past the underlying stone masonry blocks (see Photo No. 4). The upstream face has undergone considerable deterioration and localized slumping. Displacement of up to 5 inches of the concrete slabs to the left of the spillway structure was observed. Also to the left of the spillway structure, the concrete veneer coating on top of the stone masonry walls has separated up to 2.5 inches as a result of movement toward the reservoir. At Sta 3+40, a portion of the wall approximately 2.5 feet in length has been partially eroded away and displaced (see Photo No. 8). The concrete veneer coating ends at approximately Sta 3+90. Beyond this point in the direction of the left abutment, the wall has partially collapsed and there is extensive sloughing and erosion on the earth embankment (See Photo No. 11).

The downstream wall is primarily dry stone masonry construction with previous pointing evident on many of the joint surfaces near the spillway. In the vicinity of the right end of the dam, several of the large cap blocks have been displaced inward approximately one foot. At the bend in the downstream face of the dam, two anchors have been drilled into the face of the dam and beyond the cap stone into the earth embankment to provide hold down for a recently installed set of telephone poles. (See Photos Nos. 13 and 14 and Sheet B-1). Three trees up to 20-inch diameter are within 8 feet of the downstream toe. The ground is wet and soggy at the toe of the downstream face for a distance of 10 feet approximately 20 feet to the right of the right edge of the spillway. No evidence of flow was detected in the soggy area during the visit.

c. Appurtenant Structures

The spillway consists of a stone masonry wall with a concrete cap as shown in Photo No. 1. At the time of the inspection, water was flowing over the spillway. Some gravel fill has been placed in the vicinity of the left spillway training wall which suggests a portion of the embankment may have been washed out in the past as a result of a period of high flow over the spillway. Minor seepage was observed between the blocks adjacent to the right edge of the spillway. No quantity of flow could be estimated. The water was clear with no evidence of fines.

There is a 10 foot by 10 foot wooden platform outlet structure which houses two drop screens, three valve shafts and a 4-inch drawoff pipe. This structure appears to be in good condition.

d. Reservoir Area

The watershed area in the vicinity of the dam is generally wooded, with several residences on the west side along Bushy Hill Road. There was no evidence of instability along the banks of the reservoir.

e. Downstream Channel

The downstream channel is bounded by hand-placed stone walls, trees, and boulders after it passes underneath the roadway, as noted in Photo No. 16. The channel floor is lined with cobbles and boulders.

3.2 Evaluation

Based on the results of the visual inspection, the dam is judged to be in fair condition. The inspection disclosed the following items which require attention.

a. The upstream stone masonry wall and concrete cap are deteriorated and have collapsed at numerous locations.

b. The earth embankment is eroded and is sloughing to the left of the intact upstream masonry wall and has no protection against erosion.

c. The ground is wet and soggy at one location adjacent to the downstream wall.

d. Several earth anchors have been installed in the earth embankment and downstream masonry wall to support the adjacent telephone poles.

e. Seepage is occurring through joints between the stones of the downstream vertical wall to the right of the spillway channel.

SECTION 4
OPERATIONAL AND MAINTENANCE PROCEDURE

4.1 Operational Procedures

a. General

The dam creates an impoundment of the water which is used primarily for an industrial water supply.

b. Description of any Warning System in Effect

There are no warning systems in effect at this facility.

4.2 Maintenance Procedures

a. General

Maintenance of the dam is done on an infrequent basis.

b. Operating Facilities

Maintenance work on the operating facilities is done infrequently.

4.3 Evaluation

The current maintenance procedures for the dam are inadequate. A formal downstream warning system should be developed and put into effect in case of an emergency at the dam. Also, a program of annual technical inspections by qualified registered engineers should be instituted.

SECTION 5 EVALUATION OF HYDROLOGIC AND HYDRAULIC FEATURES

5.1 General

Comstock Pond Dam consists of a 540 foot long earthen dam with stone walls on the upstream and downstream faces. The spillway is a broad crested weir type with a concrete slab bottom. The maximum structural height of the dam is 8 feet. Appurtenant structures other than the spillway include the spillway channel and an outlet works. The spillway weir is located at elevation 109.0. The outlet works consist of a screened intake and three gate valves which control one outlet conduit and two service water pipes. The 15-inch outlet exits below the spillway at elevation 100.9. The service pipes go to the Pratt Read Corporation which is across the street. There is also a 4-inch emergency fire drawoff pipe.

Comstock Pond Dam is classified as being small in size having a maximum storage of 57 acre-feet.

5.2 Design Data

No hydrologic or hydraulic design data were disclosed for this dam.

5.3 Experience Data

The maximum discharge at this dam site is unknown. No evidence of damage to any portion of the project from overtopping was visible at the time of the inspection.

5.4 Test Flood Analysis

As no detailed design and operational information are available, hydrologic evaluation was performed using dam information gathered by field inspection, watershed size and an estimated test flood equal to 1/2 the Probable Maximum Flood (PMF) as determined by guide curves issued by the Corps of Engineers. Based on a drainage area of 1.06 square miles, and using a peak inflow value of 1075 cfs/sq. mi. from the "rolling terrain" curve, the test flood peak inflow is estimated to be 1140 cfs. Following the guidance for Estimating Effect of Surge Storage on Maximum Probable Discharges results in a test flood discharge of 1075 cfs. The maximum spillway capacity with the reservoir at the top of the dam is 185 cfs or 17% of the test flood discharge. A full test flood would overtop the dam by 0.9 feet.

5.5 Dam Failure Analysis

The impact of failure of the dam at maximum pool (top of dam) was assessed using the "Rule of Thumb" Guidance for Estimating Downstream Dam Failure Hydrographs issued by the Corps of Engineers. The hazard potential classification of the dam is HIGH because its failure could mean the loss of more than a few lives.

A major breach of this dam was evaluated using a breach width of 210 feet and a resultant peak discharge of 7545 cfs. The spillway discharge with water at the top of dam of 185 cfs would overtop the 48-inch culvert under Main Street and, therefore, the dam breach would add to the surcharge height over Main Street. This flood wave would immediately pass through a residential neighborhood across Main Street from the dam with the resultant flooding of 4 or 5 residences with 1 to 3 feet of water (see Sheet D-1). Additionally, the Pratt Read Corporation would be subject to approximately 3 feet of flooding. A large swampy area located 1500 feet downstream of the dam would then attenuate the flood waters. A listing of the pre and post dam failure elevations follows, and locations of the sections can be found on page D-1.

<u>Downstream Reach</u>		<u>Pre-Failure</u>	<u>Post-Failure</u>	<u>Houses Affected</u>	
<u>Section</u>	<u>Distance(ft.)</u>	<u>Elevation NGVD</u>	<u>Elevation NGVD</u>	<u>No.</u>	<u>Elev. NGVD</u>
Damsite	0	104.8	108.5		
A	250	100.7	103.4	3	100-102
B	570	80.3	83.2	2	90-95
C	1520	80.2	83.6	Factory	80-90

In light of these potential impacts, a hazard rating of high appears warranted.

SECTION 6 EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

The visual inspection did not disclose any immediate instability problems or indicate any damage from overtopping. However, the continued deterioration of the upstream wall and erosion of the embankment could affect the long-term performance of the dam.

6.2 Design and Construction Data

No information was available concerning the type of soil in the earth portion of the structure and foundation conditions. Thus the evaluation of stability is based on visual inspection.

6.3 Post Construction Changes

The only available information on post-construction changes is found in the three letters mentioned in Section 1.2 h, copies of which are included in Appendix B.

6.4 Seismic Stability

The dam is located within Seismic Zone 1 and in accordance with the Corps of Engineers' guidelines, does not warrant further seismic analysis at this time.

SECTION 7 ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

Based on the visual inspection, the Comstock Pond Dam appears to be in fair condition. The major concerns regarding the future performance of this dam include:

1. The upstream stone wall has collapsed at several locations.
2. The earth embankment is sloughing and eroding at numerous locations, particularly behind collapsed sections of the upstream wall.
3. An area adjacent to the downstream vertical stone masonry wall is wet and soggy.
4. Seepage is occurring through joints between the stones of the downstream vertical wall to the right of the spillway channel.

b. Adequacy of Information

The lack of in-depth engineering data did not allow for a definitive review. Therefore, the safety of the dam with respect to soils, geology and geotechnical engineering is based on visual inspection.

c. Urgency

The recommendations and remedial measures described below should be implemented by the owner within one year after he receives this Phase I Inspection Report.

7.2 Recommendations

The following recommendations should be carried out under the supervision of a qualified professional engineer experienced in the design and construction of earth dams:

1. Investigate paths of seepage through the joints of the stone masonry forming the downstream face to the right of the spillway, and design and oversee construction of remedial measures, if required.
2. Investigate the cause of a soft, wet spot adjacent to the toe of the downstream masonry wall and design and oversee construction of remedial measures, if needed.
3. Replace or reset all loose and displaced blocks and broken concrete in the stone wall forming the upstream masonry wall.
4. Repair the areas of erosion and sloughing along the upstream face to the right of the masonry wall and protect the upstream face from ice and wave erosion using properly engineered and placed riprap.
5. The anchors should be removed and the holes backfilled.
6. Perform a detailed hydrologic and hydraulic investigation to assess further the potential of overtopping the dam and the need for and means to increase project discharge capacity.
7. Remove trees, stumps, and root systems located within 15 feet of the downstream masonry wall of the dam, and backfill with proper material.

7.3 Remedial measures

a. Operating and Maintenance Procedures

1. Remove trees growing within 15 feet of downstream masonry wall of dam.
2. Remove trees growing within 25 feet on either side of the downstream channel between the property line and the toe of the dam.
3. Visually inspect the dam once each month.
4. Engage a professional engineer qualified in the design and construction of dams to make a comprehensive technical inspection of the dam once every year.
5. Establish a surveillance program for use during and immediately after rainfall and also a downstream warning program to follow in case of emergency.
6. Fill in all animal burrows along crest of dam.

7. Inspect the downstream face of spillway with no flow over the crest.

7.4 Alternatives

There are no practical alternatives to the recommendations of Sections 7.2 and 7.3.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT COMSTOCK POND DAM

DATE November 25, 1980

TIME 0900

WEATHER Overcast, 45°F

W.S. ELEV. 109.03 U.S. DN.S.

PARTY:

- | | |
|------------------------------------|-----------|
| 1. <u>Bob Chappell - Genovese</u> | 6. _____ |
| 2. <u>Walt Gancarz - Genovese</u> | 7. _____ |
| 3. <u>Richard F. Murdock - GEI</u> | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Geotechnical</u>	<u>R. Murdock</u>	
2. <u>Structural</u>	<u>R. Chappell</u>	
3. <u>Hydraulics</u>	<u>W. Gancarz</u>	
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		
9. _____		
10. _____		

PERIODIC INSPECTION CHECK LIST

PROJECT COMSTOCK POND DAM

DATE November 25, 1980

PROJECT FEATURE Dam Embankment

NAME _____

DISCIPLINE Geotechnical

NAME Murdock

AREA EVALUATED	CONDITIONS
<u>DAM EMBANKMENT</u>	
Crest Elevation	111.0
Current Pool Elevation	109.0
Maximum Impoundment to Date	Unknown
Surface Cracks	None Observed
Pavement Condition	Grass-covered surface, evidence of animal burrows.
Movement or Settlement of Crest	Crest appears to dip toward reservoir
Lateral Movement	None observed.
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Depression on crest adjacent to both right and left wingwalls
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	None
Sloughing or Erosion of Slopes or Abutments	Not observed
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None observed
Unusual Embankment or Downstream Seepage	Wet and soggy along toe near right end of spillway.
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None
Vegetation	Crest - grass-covered

PERIODIC INSPECTION CHECK LIST

PROJECT COMSTOCK POND DAM

DATE November 25, 1980

PROJECT FEATURE Dike Embankment

NAME _____

DISCIPLINE Geotechnical

NAME Murdock

AREA EVALUATED

CONDITION

DIKE EMBANKMENT

Crest Elevation

No dike embankment

Current Pool Elevation

Maximum Impoundment to Date

Surface Cracks

Pavement Condition

Movement or Settlement of Crest

Lateral Movement

Vertical Alignment

Horizontal Alignment

Condition at Abutment and at Concrete Structures

Indications of Movement of Structural Items on Slopes

Trespassing on Slopes

Sloughing or Erosion of Slopes or Abutments

Rock Slope Protection - Riprap Failures

Unusual Movement or Cracking at or near Toes

Unusual Embankment or Downstream Seepage

Piping or Boils

Foundation Drainage Features

Toe Drains

Instrumentation System

Vegetation

PERIODIC INSPECTION CHECK LIST

PROJECT Comstock Pond Dam

DATE November 25, 1980

PROJECT FEATURE Intake Structure

NAME _____

DISCIPLINE Structural/Hydraulics

NAME Chappell/Gancarz

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u></p> <p>a. Approach Channel</p> <p>Slope Conditions</p> <p>Bottom Conditions</p> <p>Rock Slides or Falls</p> <p>Log Boom</p> <p>Debris</p> <p>Condition of Concrete Lining</p> <p>Drains or Weep Holes</p> <p>b. Intake Structure</p> <p>Condition of Concrete</p> <p>Slots</p>	<p>Under water - not observed.</p> <p>None</p> <p>Little</p> <p>Cracked</p> <p>Good</p>

PERIODIC INSPECTION CHECK LIST

PROJECT Comstock Pond Dam

DATE November 25, 1980

PROJECT FEATURE Control Tower

NAME _____

DISCIPLINE Structural

NAME Chappell

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	10 foot x 10 foot Wooden Platform
a. Concrete and Structural	
General Condition	Good
Condition of Joints	Good
Spalling	N/A
Visible Reinforcing	N/A
Rusting or Staining of Concrete	N/A
Any Seepage or Efflorescence	N/A
Joint Alignment	Good
Unusual seepage or Leaks in Gate Chamber	N/A
Cracks	N/A
Rusting or Corrosion of Steel	N/A
b. Mechanical and Electrical	
Air Vents	N/A
Float Wells	N/A
Crane Hoist	N/A
Elevator	N/A
Hydraulic System	N/A
Service Gates	N/A
Emergency Gates	N/A
Lightning Protection System	N/A
Emergency Power System	N/A
Wiring and Lighting System	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT Comstock Pond Dam

DATE November 25, 1980

PROJECT FEATURE Conduit

NAME _____

DISCIPLINE Hydraulic/Structural

NAME Gancarz/Chappell

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - TRANSITION AND CONDUIT</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining on Concrete</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Cracking</p> <p>Alignment of Monoliths</p> <p>Alignment of Joints</p> <p>Numbering of Monoliths</p>	<p>Not Observable</p>

PERIODIC INSPECTION CHECK LIST

PROJECT Comstock Pond Dam

DATE November 25, 1980

PROJECT FEATURE Outlet Works

NAME _____

DISCIPLINE Hydraulics

NAME Gancarz

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u></p> <p>General Condition of Concrete</p> <p>Rust or Staining</p> <p>Spalling</p> <p>Erosion or Cavitation</p> <p>Visible Reinforcing</p> <p>Any Seepage or Efflorescence</p> <p>Condition at Joints</p> <p>Drain holes</p> <p>Channel</p> <p>Loose Rock or Trees Overhanging Channel</p> <p>Condition of Discharge Channel</p>	<p>Good. Clear of debris</p>

PERIODIC INSPECTION CHECK LIST

PROJECT Comstock Pond Dam

DATE November 25, 1980

PROJECT FEATURE _____

NAME _____

DISCIPLINE Structural/Hydraulics
Geotechnical

NAME Chappell/Gancarz/Murdock

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	Under water, appears to be concrete.
a. Approach Channel	
General Condition	Good
Loose Rock Overhanging Channel	N/A
Trees Overhanging Channel	N/A
Floor of Approach Channel	Natural. Spillway is concrete
b. Weir and Training Walls	
General Condition of Concrete	Good - some cracks
Rust or Staining	Some
Spalling	No
Any Visible Reinforcing	No
Any Seepage or Efflorescence	No
Drain Holes	
c. Discharge Channel	
General Condition	Concrete slab broken downstream of spillway, flows under roadway through Culvert.
Loose Rock Overhanging Channel	
Trees Overhanging Channel	On both sides of channel downstream roadway.
Floor of Channel	Natural Stream bed.
Other Obstructions	Large boulders in channel, constricting the flow at several locations.
Other Comments	Right downstream training wall needs better protection at road embankment

PERIODIC INSPECTION CHECK LIST

PROJECT Comstock Pond Dam

DATE November 25, 1980

PROJECT FEATURE Service Bridge

NAME _____

DISCIPLINE Structural

NAME Chappell

AREA EVALUATED

CONDITION

OUTLET WORKS - SERVICE BRIDGE

No service bridge

a. Super Structure

Bearings

Anchor Bolts

Bridge Seat

Longitudinal Members

Under Side of Deck

Secondary Bracing

Deck

Drainage System

Railings

Expansion Joints

Paint

b. Abutment & Piers

General Condition of Concrete

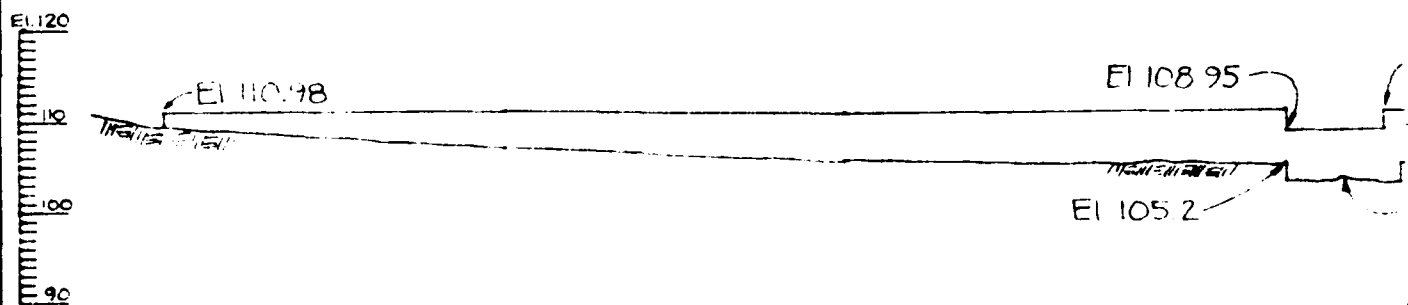
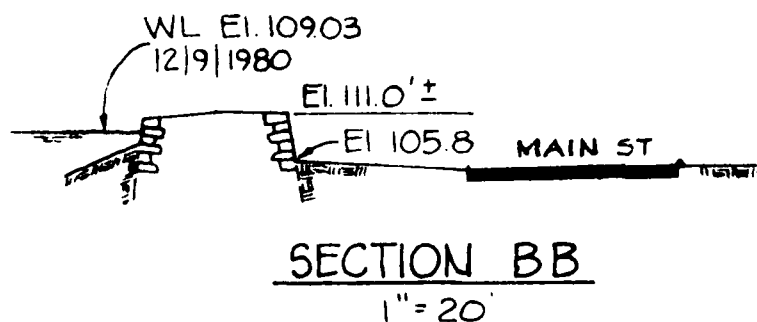
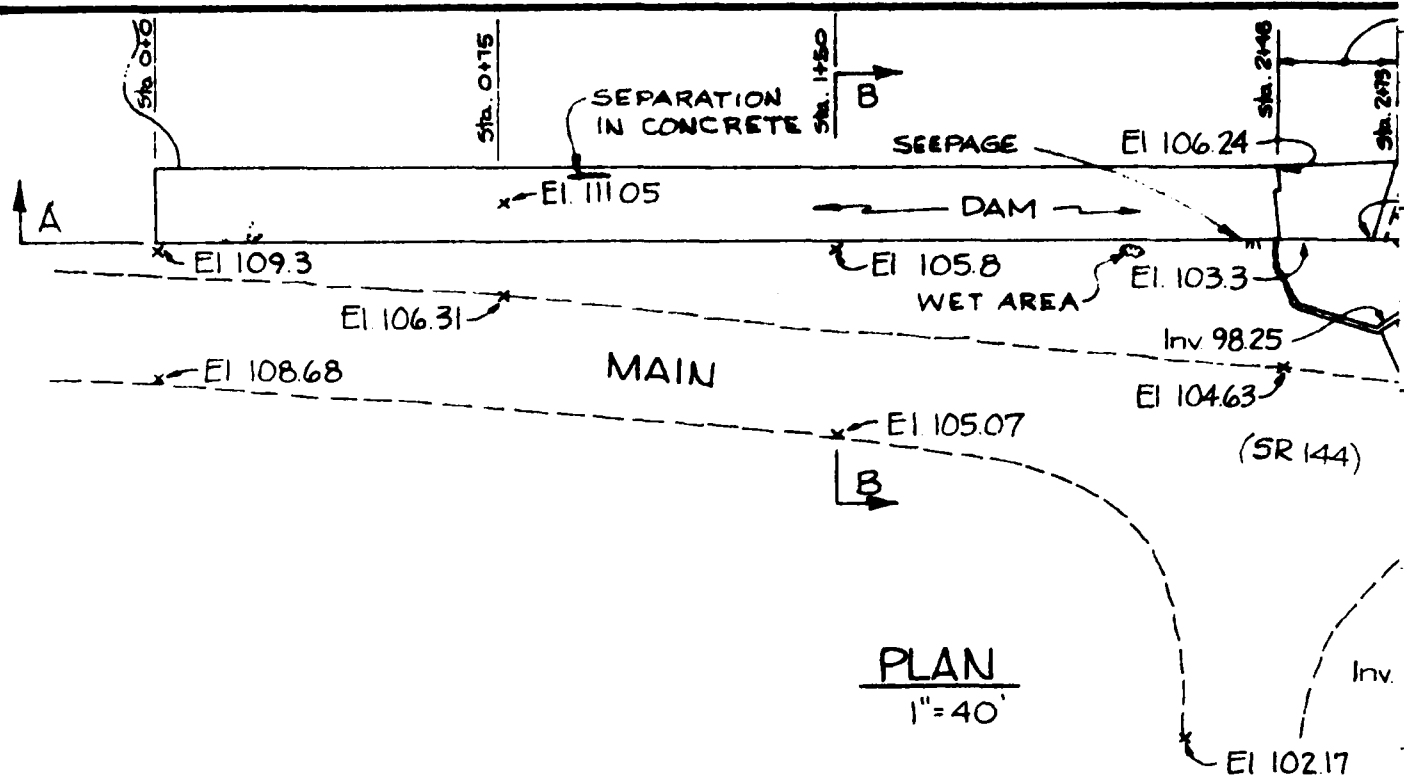
Alignment of Abutment

Approach to Bridge

Condition of Seat & Backwall

APPENDIX B

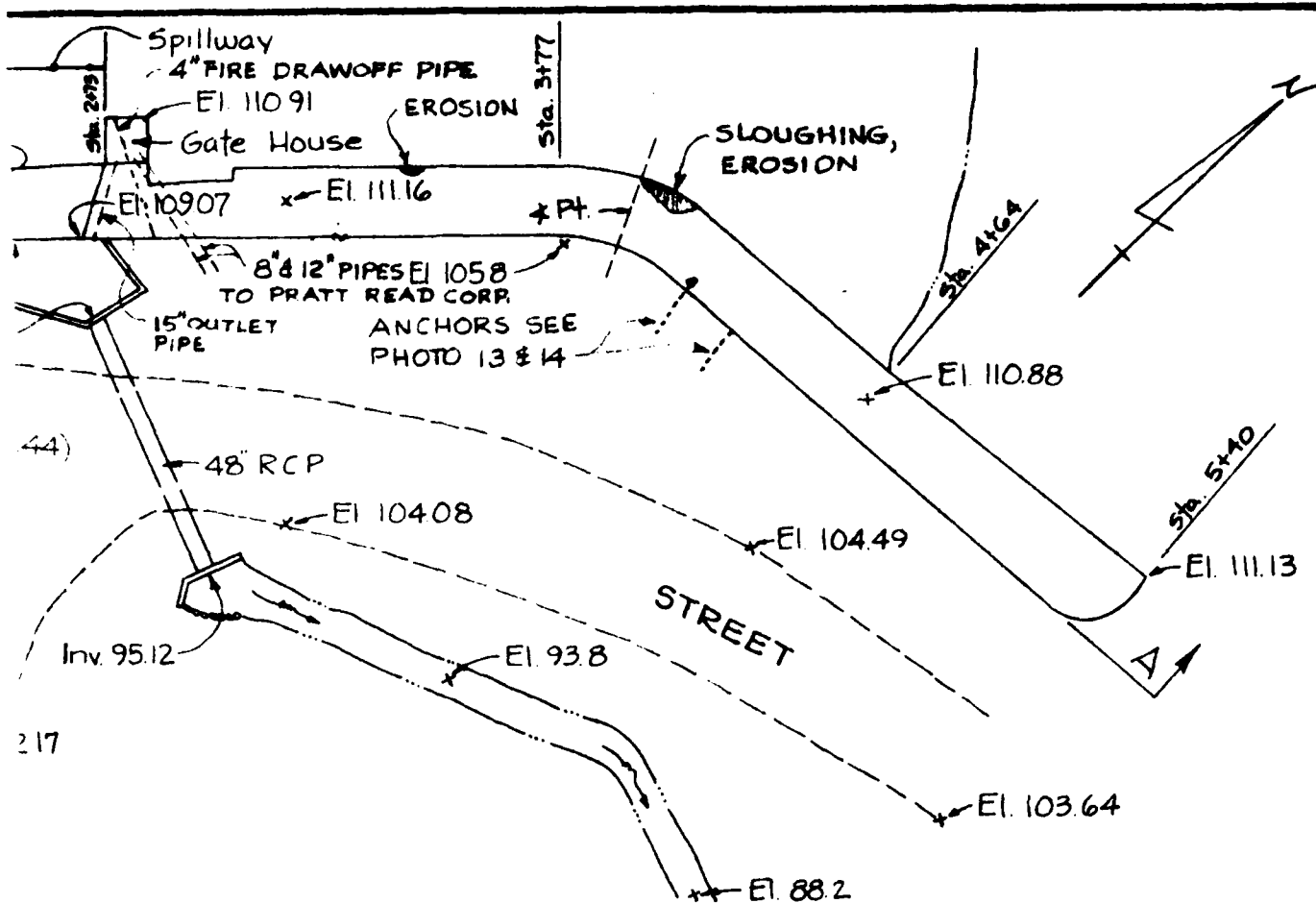
ENGINEERING DATA



Drawing Prepared Using Field
Survey by G&A 12/9/1980



El.



217

ION AA

3.1"=40' VERT 1"=20'

PHILIP W GENOVESE & ASSOCIATES, INC.
 ENGINEERS
 HAMDEN, CONNECTICUT

COMSTOCK POND DAM (CT00424)

5-1

2

✓
November 1, 1955

Mr. Joseph L. Cucinotta
First Selectman
Essex, Connecticut

Dear Mr. Cucinotta:

At your request, the undersigned inspected five dams on Falls River and its tributary during the months of September and October. These dams are at:

Messerschmidt Pond and Wright's Pond in Westbrook;
Bushy Hill Pond in Deep River;
Comstock Pond and Bischoff's Pond in Ivoryton (Essex).

All of the dams were found to be substantially in good condition with only minor items of repairs to be recommended. These items will be called to the attention of the individual owners involved.

The dam at Bischoff's Pond was found to have eight-inch flashboards on the spillway. Mr. Johnson, Plant Maintenance Superintendent of Bischoff's, agreed with my suggestion of having these flashboards removed in order to help alleviate some of the flooding which you have experienced at the Walnut Street Bridge.

It is further recommended that you contact the various owners and inaugurate a coordinated plan of draining down each pond to the lowest level possible consistent with operating factors involved, during periods of anticipated heavy rains. The additional storage capacity created by this draw-down would also help to alleviate the flooding condition at Walnut Street.

Very truly yours,

Jjm:ans

John J. Mozzochi
Member of the Board

CC State Board of
Supervision of Dams

B-2

November 1, 1955

Pratt Read & Company
Ivoryton
Connecticut

Att: H. G. Tomlinson, Maintenance Supt.

Gentlemen:

On September 16, 1955, the writer inspected the Bushy Hill Pond and the Comstock Pond Dams which you own in Deep River and Ivoryton. This inspection was made in company with your Messrs. R. L. Glaserer and H. G. Tomlinson, and Joseph L. Cucinotta, First Selectman of Essex.

At that time, the writer made the following recommendations for repairs:

- (1) Bushy Hill Pond:
 - (a) Pave spillway apron with masonry or concrete
 - (b) Widen and straighten out spillway channel
- (2) Comstock Pond:
 - (a) Pave spillway apron with masonry or concrete
 - (b) Strengthen earth face of dam at several places where eroded.
Material should be clay.

Another inspection of Comstock Pond Dam was made on October 28. It now appears that some immediate attention should be given to the repairs for the spillway apron as the condition appears to have worsened somewhat since my first inspection. Will you kindly notify me as soon as this work is undertaken?

Very truly yours,

John J. Mozzochi
Member of the Board

Jjm:ans

CC State Board of
Supervision of Dams

B-3

PIANO KEYS

ACTIONS IVORY



Pratt, Read & Co.

INCORPORATED

OFFICE OF THE PRESIDENT

IVORYTON
CONNECTICUT

RECEIVED

JUN 27 1956

June 26, 1956 STATE WATER COMMISSION

State Board of Supervision of Dams
Room 317, State Office Building
Hartford, Connecticut

Gentlemen:

We are writing in reference to your letter of November 1, 1955, written to the attention of our Mr. H.G. Tomlinson, Maintenance Supt. We feel we have now complied with the recommendations made by you in this letter.

(1) Bushy Hill Pond:

- (a) We have not paved the spillway apron with masonry or concrete as this spillway has a stone base. } WILL BE DONE SOON
- (b) We have widened and cleaned up the spillway channel. This has been accomplished by the elimination of several large trees and we have cleaned up and burned all leaves, debris, etc. We are also keeping the pond down approximately two (2) feet below its normal level.

(2) Comstock Pond: (Clark's Pond)

- (a) We have paved the spillway apron with concrete.
- (b) We have strengthened the earth face of the dam the entire length by building a stone wall the entire length of the dam, with a concrete cap, and have filled in back of this stone wall and planted grass.

We would appreciate your representative calling on us at his convenience and looking over the work we have accomplished.

Again, thank you for your assistance.

Yours truly,

PRATT, READ & CO., INC.

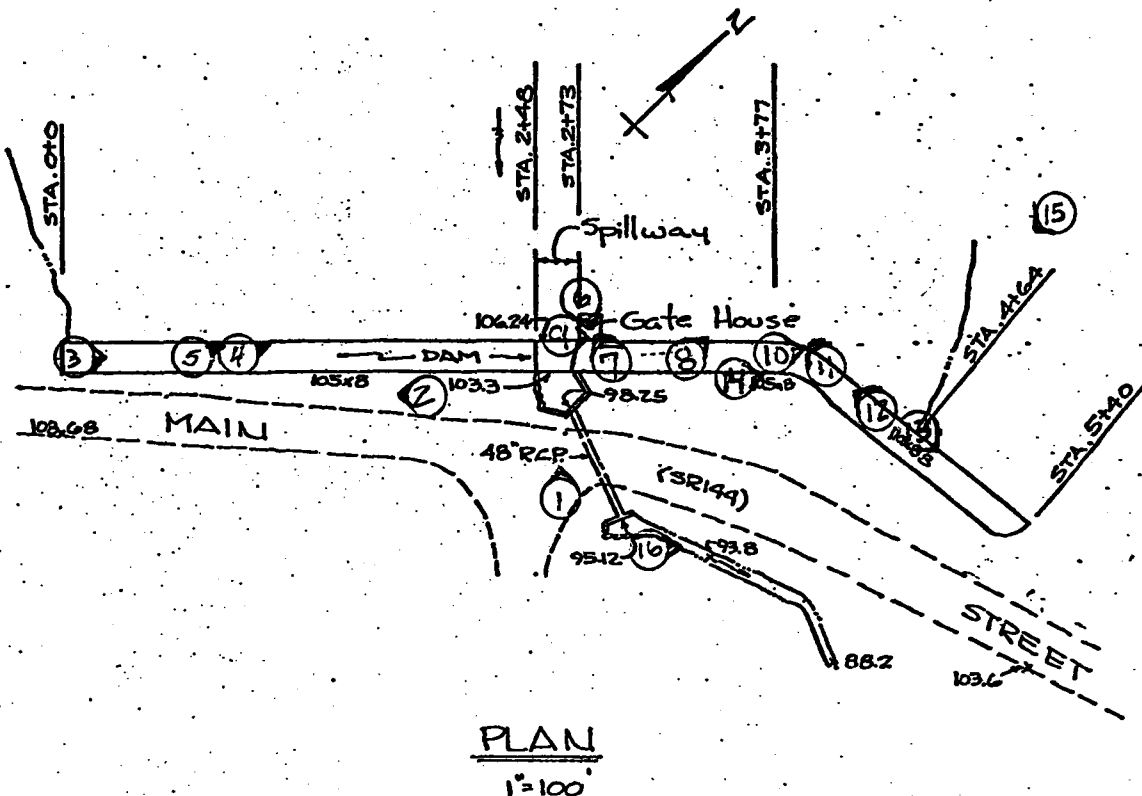
Peter H. Comstock
PETER H. COMSTOCK

INSPECTED
7/12/56
PHC/AJP
OK.

B-4

APPENDIX C

PHOTOGRAPHS



REFERS TO PHOTO NUMBER,
LOCATION AND DIRECTION

U.S. ARMY ENGINEER DIV.
NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

PHILIP W. GENOVESE AND
ASSOCIATES, INC.
ENGINEERS - HAMDEN, CT.

NATIONAL
PROGRAM
OF
INSPECTION
OF
NON-FED
DAMS
C-1

PHOTO LOCATION PLAN

COMSTOCK POND DAM

FALLS RIVER

ESSEX,

CONNECTICUT



1 Spillway from location downstream on south side of road.



2 Sta 2+00, looking along downstream wall toward right abutment, Sta 1+00 in center of photo, wall 5.5 feet high.

Note: Hole in wall 14 inches wide, 11 inches high, 12 inches deep (Sta 1+95) 2.5 feet down from top of wall.



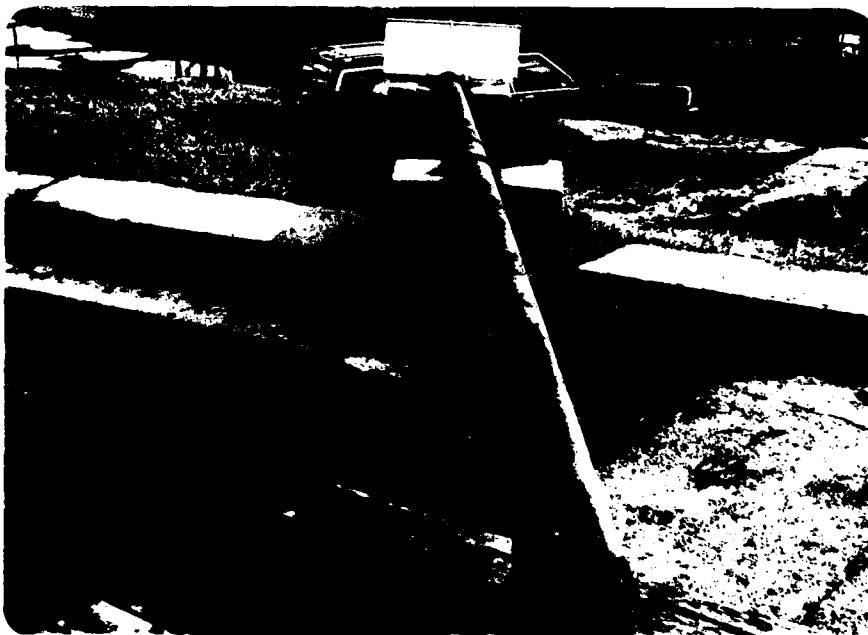
3 Sta 0+00 (end of dam, right side) looking toward spillway, Sta 1+00 and 2+00 visible.



4 Sta 1+00, crack in concrete along upstream edge, 1 foot long, 3 inches wide, 1 foot deep, 3 feet from edge of upstream wall.



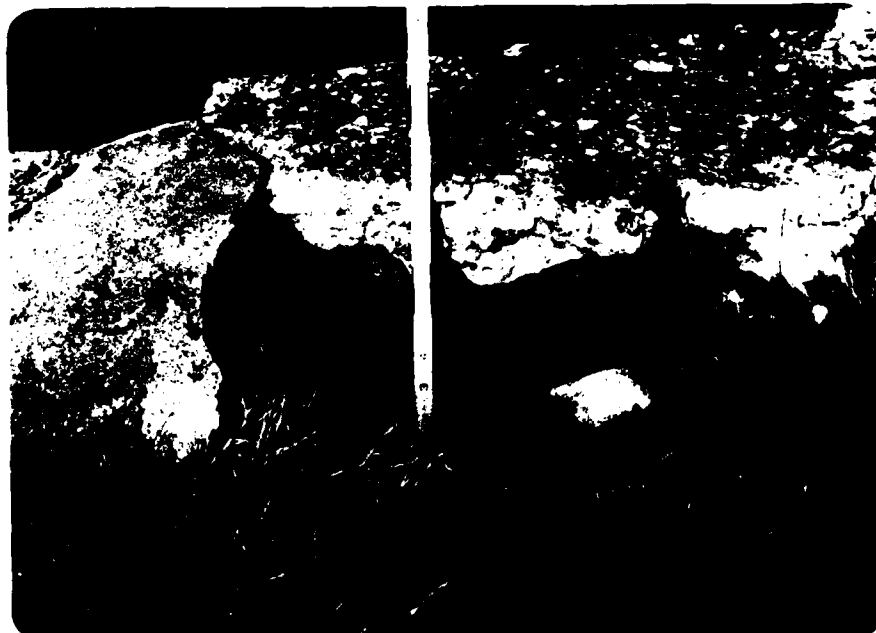
5 Another photo of crack noted in Photo 4.



6 Sta 2+73, looking along upstream face of wall; displacement of concrete slabs beneath pipe 5 inches downward.



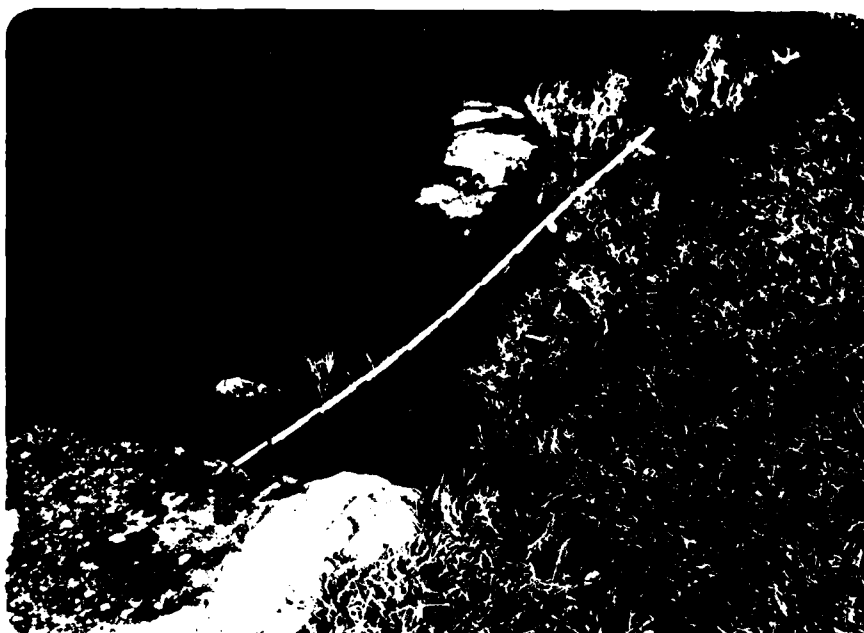
7 Depression of crest adjacent to left spillway training wall, 7 inches deep, rule extended 5.5 feet.



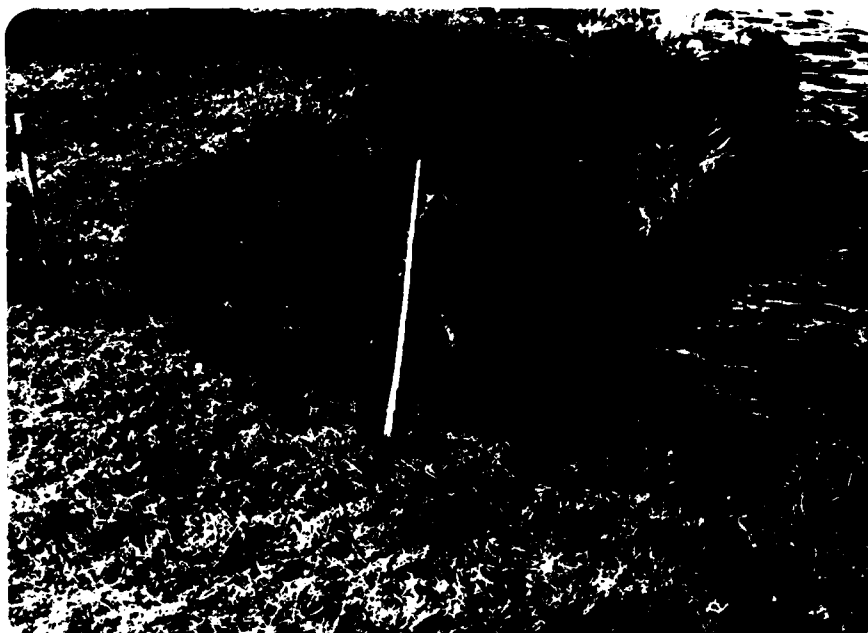
8 Sta 3+40, portion of wall (2.5 feet long) has been eroded away below concrete cap.



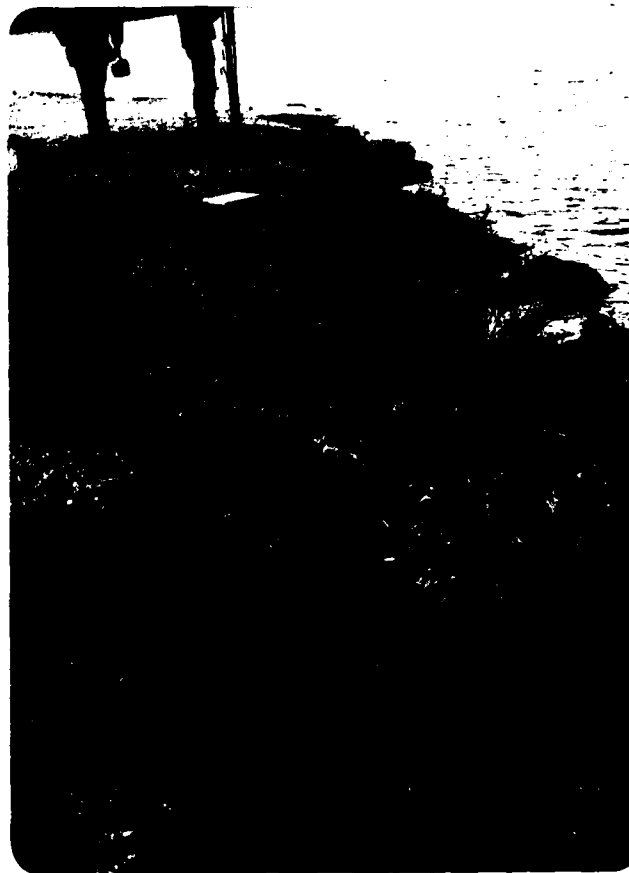
9 Sta 3+00, looking along upstream edge of crest, displacement toward reservoir, up to 4 inches vertical displacement between top of wall and adjacent soil crest.



10 Sta 3+90, upstream face has been displaced, rule extended 6 feet.



11 Erosion feature at Sta 4+00. Upstream face missing at this point, 8 - 10 feet wide, 2 feet deep.



12 Sta 4+45, looking back toward Sta 4+00 along crest.

PHILIP W. GENOVESE & ASSOCIATES, INC.
ENGINEERS HAMDEN, CONNECTICUT

COMSTOCK POND DAM (CT00424)



13 Sta 4+00, looking toward left abutment.



14 Sta 4+15, telephone pole anchored into dam, tree 8 feet from face, 16 inch diameter.



15 Upstream face of dam, Sta 4+00 in foreground of photo, note displaced upstream face.



16 Downstream channel on south side of road.

PHILIP W. GENOVESE & ASSOCIATES, INC.
ENGINEERS

HAMDEN, CONNECTICUT

COMSTOCK POND DAM (CT00424)

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



0 2000 4000 FT.
SCALE

DRAINAGE & IMPACT AREA ESSEX QUAD

DRAINAGE AREA = 1.06 SQ. M.

PHILIP W. GENOVESE & ASSOCIATES, INC.
ENGINEERS
HAMDEN, CONNECTICUT

COMSTOCK POND DAM (CT00424)

D-1 of D14

PROJ. NO. 804105
DESCRIPTION Const. of Pond Dam
Essex Ct. (Troyton)

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D2 OF D14
BY TKC DATE 12/12/77
CHKD. BY UG DATE 2/27/78

Hydrologic/Hydraulic Computations
Const. of Pond Dam

Size Classification:

Surface Area = 5.5 ac. ; Drainage Area = 1.06 sq. mi.

Top of Dam = elev. 111.0

Downstream L.P. = elev. 103.3

Height of Dam = 7.7'

Storage (S) = $b \times h + b \times h$

$S = (5.5)(7.7) + ((5.5 + 9.56)/2)(2)$

$S = 42.3 + 15.1$

$S = 57.4$ AC-FT

∴ the size of the dam is SMALL. The hazard potential of the dam is in the SIGNIFICANT to HIGH range as there are houses and a factory directly across the street from this dam. Taking a HIGH hazard potential for a small dam, the recommended spillway design flood (SDF) is $1/2$ the probable maximum flood (PMF).

In rolling terrain, the PMF in cfs/mi² is 2150 for a drainage area size of 1.06 mi². Therefore, the test flood will be:

$$SDF = 1/2 PMF = 1/2 (2150) \text{ cfs/mi}^2 (1.06) \text{ mi}^2$$

$$SDF = 1140 \text{ cfs}$$

$$\text{Volume of the test flood} = (53.3) \frac{\text{ac-ft}}{\text{ft}} (1.06) \text{ mi}^2 (19/2")$$

2 runs at
1/2 PMF

$$V_{11} = 546.7 \text{ ac-ft}$$

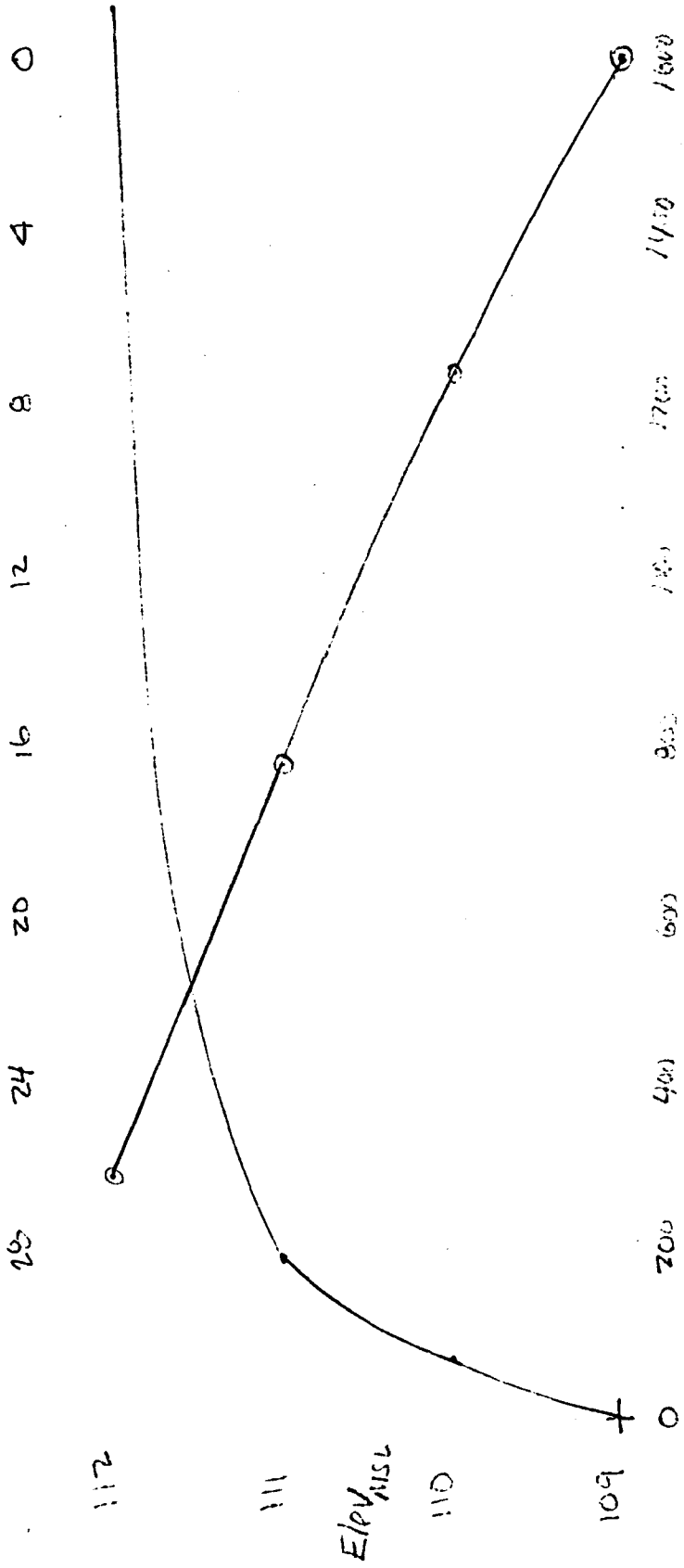
PROJ. NO. 804108
 DESCRIPTION Comstock Pond Dam
Essex, Conn.

GENOVESE AND ASSOCIATES
 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D3 OF D14
 BY WJG DATE 2-27-91
 CHKD. BY _____ DATE _____

Comstock Pond Dam

Storage (Ac-Ft)
 above Spwy Crest



Spillway Rating Curve & Stage-Storage Curve

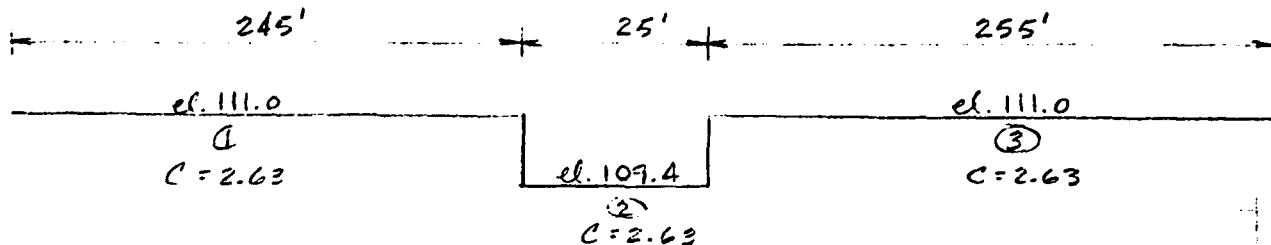
PROJ. NO. 804105
 DESCRIPTION Comstock Pond Dam
Essex, Conn.

GENOVESE AND ASSOCIATES
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SHEET NO. D4 OF D14
 BY TRC DATE 12/15/20
 CHKD. BY WJC DATE 2/27/21

COMSTOCK POND DAM (cont.)

Using the weir formula, $Q = CLH^{3/2}$, discharge rating data can be calculated:



PROFILE - COMSTOCK DAM
 N.T.S.

ELEV.	H_1	H_2	H_3	Q_1	Q_2	Q_3	Q_{TOT}
109.0	—	—	—	—	—	—	—
110.0	—	1	—	—	65.8	—	65.8
111.0	—	2	—	—	186.0	—	186.0
112.0	1	3	1	644.4	341.6	670.7	1656.7

∴ SDF of 1140 cfs will occur @ elev. 111.90 MSL

PROJ. NO. 804108
DESCRIPTION Constock Pond Dam
Essex, Conn.

GENOVESE AND ASSOCIATES
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HAMDEN, CONN.

SHEET NO. D-5 OF D-14
BY TKC DATE 12/15/81
CHKD. BY WJB DATE 2/27/81

CONSTOCK POND DAM (cont.)

Short-cut routing of SDF;

$$Q_{Pi} = Q_{Pi} \left(1 - \frac{\text{Stor}(i)}{9.5}\right) ; Q_{Pi} = 1140 \text{ cfs}$$

$$\text{Stor}(i) = \frac{(3.65') (3.3 \text{ ac})}{\left(53.3 \frac{\text{cu ft}}{\text{mi}^2}\right) (1.06 \text{ mi}^2)}$$

$$\text{Stor}(i) = 0.54''$$

$$Q_{Pi} = 1140 \left(1 - \frac{0.54}{9.5}\right)$$

$$Q_{Pi} = \underline{1075.2 \text{ cfs}} \quad @ \text{ elev. } \underline{111.85 \text{ MSL}}$$

This process is to be repeated until $\text{Stor}(i)$ is equal to the calculated equivalent surcharge height which it very nearly is at this point.

COMSTOCK POND DAM (cont.)

Dam Breaching Analysis:

$$Q_{P1} = \frac{8}{27} W_b \sqrt{g} Y_o^{3/2}$$

$$Q_{P1} = \left(\frac{8}{27}\right)(0.4)(525)(\sqrt{32.2})(7.7)^{3/2}$$

$$Q_{P1} = 7544 \text{ cfs} \quad (\text{No additional spillway flow})$$

Section A-A (250' d/s of dam)

$$Q_{P1} = 7544 \text{ cfs}$$

$$\text{elev}_1 = 103.4$$

$$A_1 = 510 \text{ ft}^2$$

$$Q_{P0} = 186 \text{ cfs}$$

$$\text{elev}_0 = 100.7$$

$$A_0 = 88 \text{ ft}^2$$

$$V_{12} = \frac{(250')(510 - 88) \text{ ft}^2}{43,560 \text{ ft}^2/\text{ac.}}$$

$$V_{12} = 2.4 \text{ ac-ft.}$$

$$Q_{P2} = Q_{P1} \left(1 - \frac{V_{12}}{S_1}\right)$$

$$Q_{P2} = 7544 \left(1 - \frac{2.4}{57.4}\right)$$

$$Q_{P2} = 7229 \text{ cfs (trial)}$$

$$\text{elev}_2 = 103.4, A_2 = 507 \text{ ft}^2, V_{12} = 2.4 \text{ ac-ft.}$$

$$Q_{P2} = 7544 \left(1 - \frac{(2.4 + 2.4)/2}{57.4}\right)$$

$$Q_{P2} = 7229 \text{ cfs}$$

$$\text{elev}_2 = 103.4$$

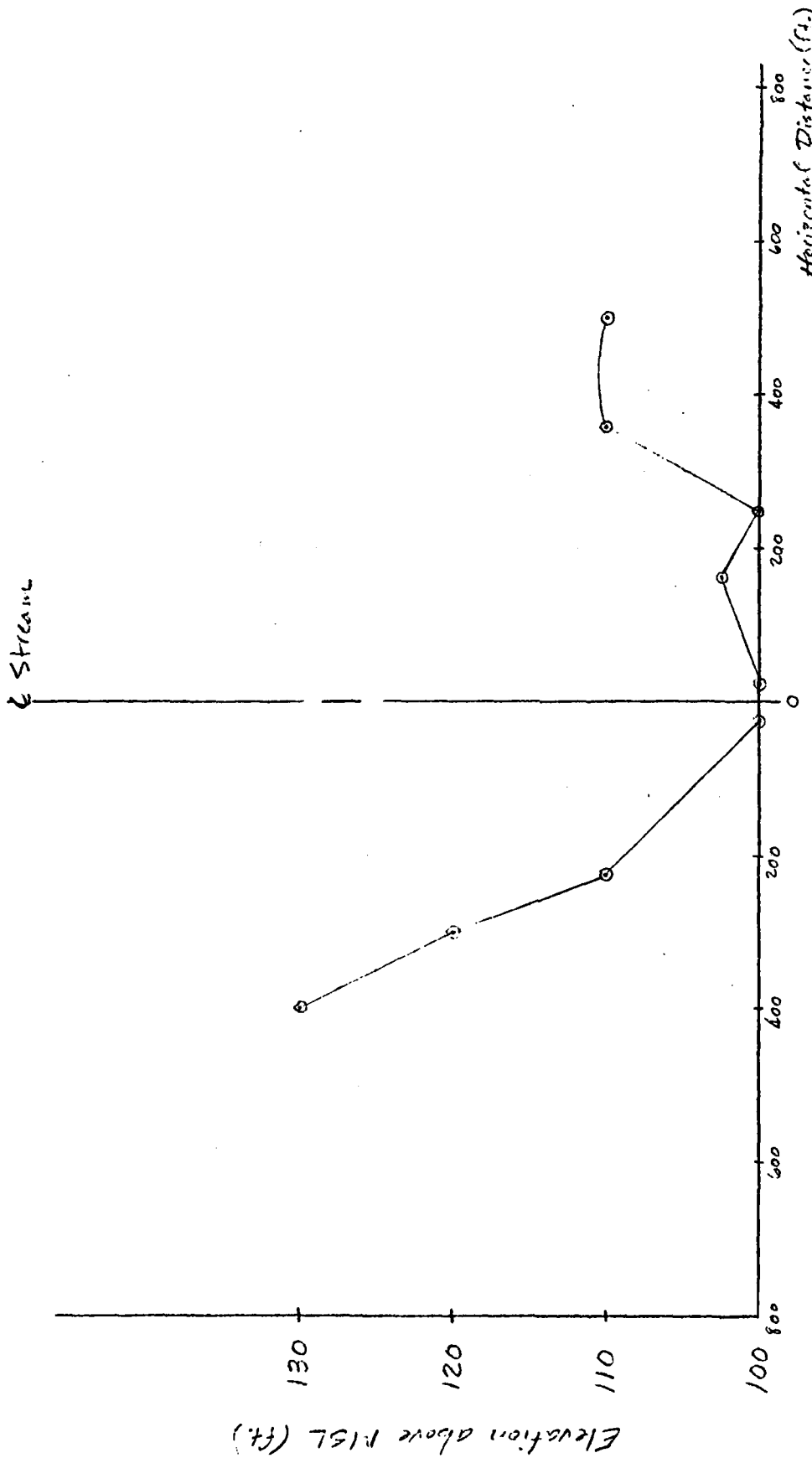
Move downstream to next section and repeat this process using $Q_{P2} = 7229$ and

$$S_2 = 57.4 - 2.4 = 55.0$$

PROJ. NO. 80110
DESCRIPTION CONISTOCK POND DAM
Essex, Conn.

GENOVESE AND ASSOCIATES
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HAMDEN, CONN.

SHEET NO. 27 OF 014
BY TKC DATE 12/1/70
CHKD. BY WG DATE 3/2/81



LOOKING DOWNSTREAM

SECTION A-A

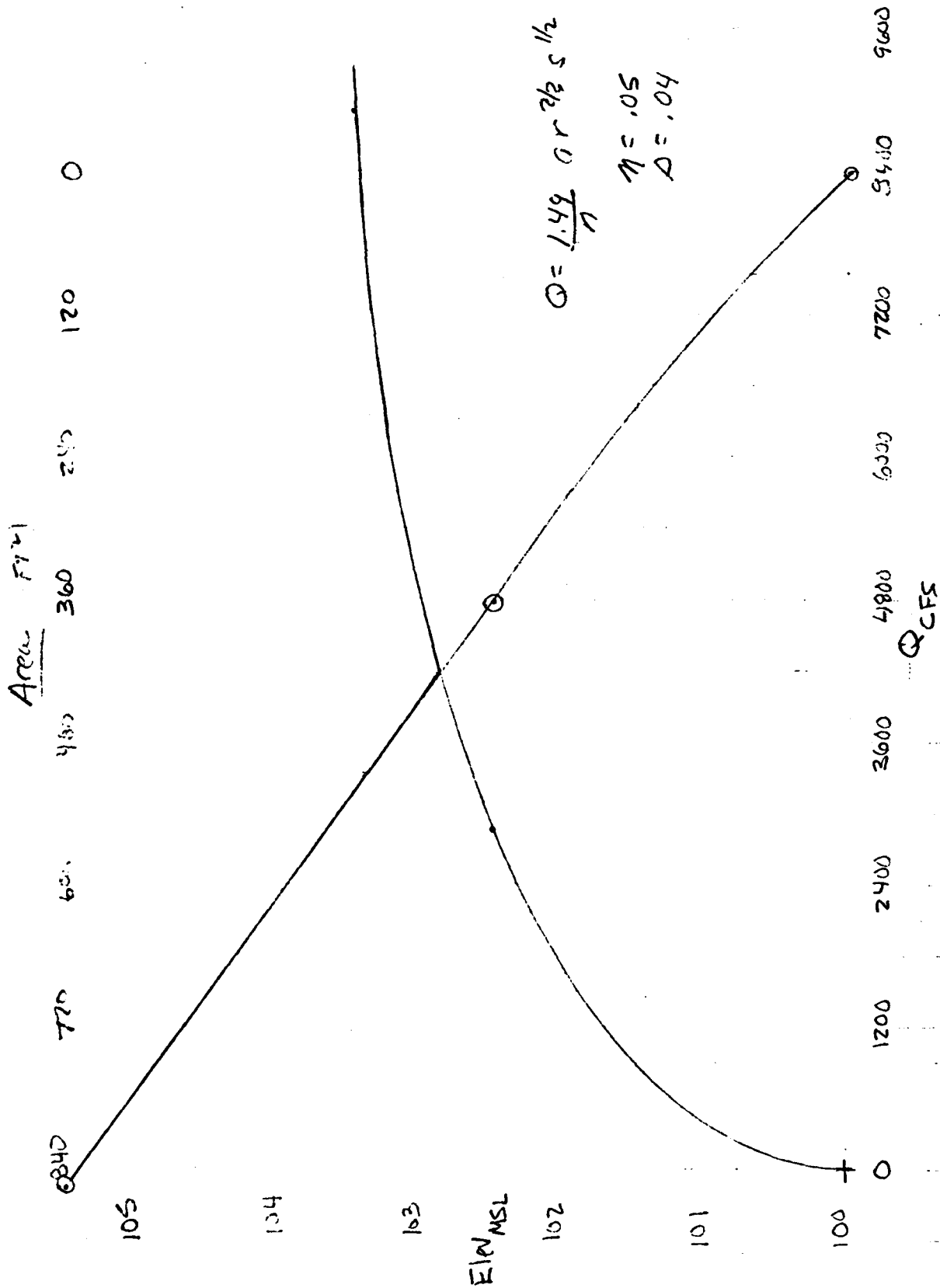
250 feet downstream of Conistock Pond Dam

PROJ. NO. 80410-3
 DESCRIPTION Comstock Pond Dam
Essex, Conn.

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 CONSULTING ENGINEERS
 HAMDEN, CONN.

SHEET NO. D8 OF D14
 BY WJG DATE 2-27-91
 CHKD. BY _____ DATE _____

Comstock Pond Dam



COMSTOCK POND DAM (cont.)

Dam Breaching Analysis (cont.)

Section B-B (320' d/s of A-A)

$$Q_{P2} = 7229 \text{ cfs}$$

$$\text{elev}_2 = 83.35$$

$$A_2 = 560 \text{ ft}^2$$

$$Q_{P0} = 186 \text{ cfs}$$

$$\text{elev}_0 = 80.3$$

$$A_0 = 30 \text{ ft}^2$$

$$V_{23} = \frac{(320)(560 - 30)}{43,560} \text{ ft}^2$$

$$V_{23} = 3.9 \text{ ac-ft.}$$

$$Q_{P3} = 7229 \left(1 - \frac{3.9}{55.0}\right)$$

$$Q_{P3} = 6716 \text{ cfs (trial)}$$

$$\text{elev}_3 = 83.25, A_3 = 322.5 \text{ ft}^2, V_{23} = 3.7 \text{ ac-ft.}$$

$$Q_{P3} = 7229 \left(1 - \frac{3.9 + 3.7/2}{55.0}\right)$$

$$Q_{P3} = 6730 \text{ cfs}$$

$$\text{elev}_3 = 83.25$$

$$S_3 = 55.0 - 3.8 = 51.2$$

Section C-C (950' d/s of B-B)

$$Q_{P3} = 6730 \text{ cfs}$$

$$\text{elev}_3 = 83.6$$

$$A_3 = 3200 \text{ ft}^2$$

$$Q_{P0} = 186 \text{ cfs.}$$

$$\text{elev}_0 = 80.2$$

$$A_0 = 165$$

$$V_{34} = \frac{(950)(3200 - 165)}{43,560}$$

$$V_{34} = 66.2 \text{ AC-FT}$$

(cont. next page)

CONSTOCK POND DAM (cont.)

Dam Breaching Analysis (cont.)

The volume in this case exceeds the 3 and therefore, the reach out flow should be determined by selecting a shorter reach. However, a look at the Quad map shows that the volume of storage within the reach would only increase. The conclusion then is that the test flood, once having passed section B-B, will tend to flood the flat region between section B-B and section C-C north of the wetlands (see map, sheet D1). This water would only slowly move out of this area because the slope of the normal stream channel is very flat.

Summary of Breach Analysis

<u>STA.</u>	<u>Q</u>	<u>ELEV</u>	<u>DEPTH</u>
Dam	7544 cfs	108.5	5.2
2+50	7229 cfs	103.4	3.4
5+70	6730 cfs	83.25	3.25
15+20	-	83.6	3.6

Conclusions:

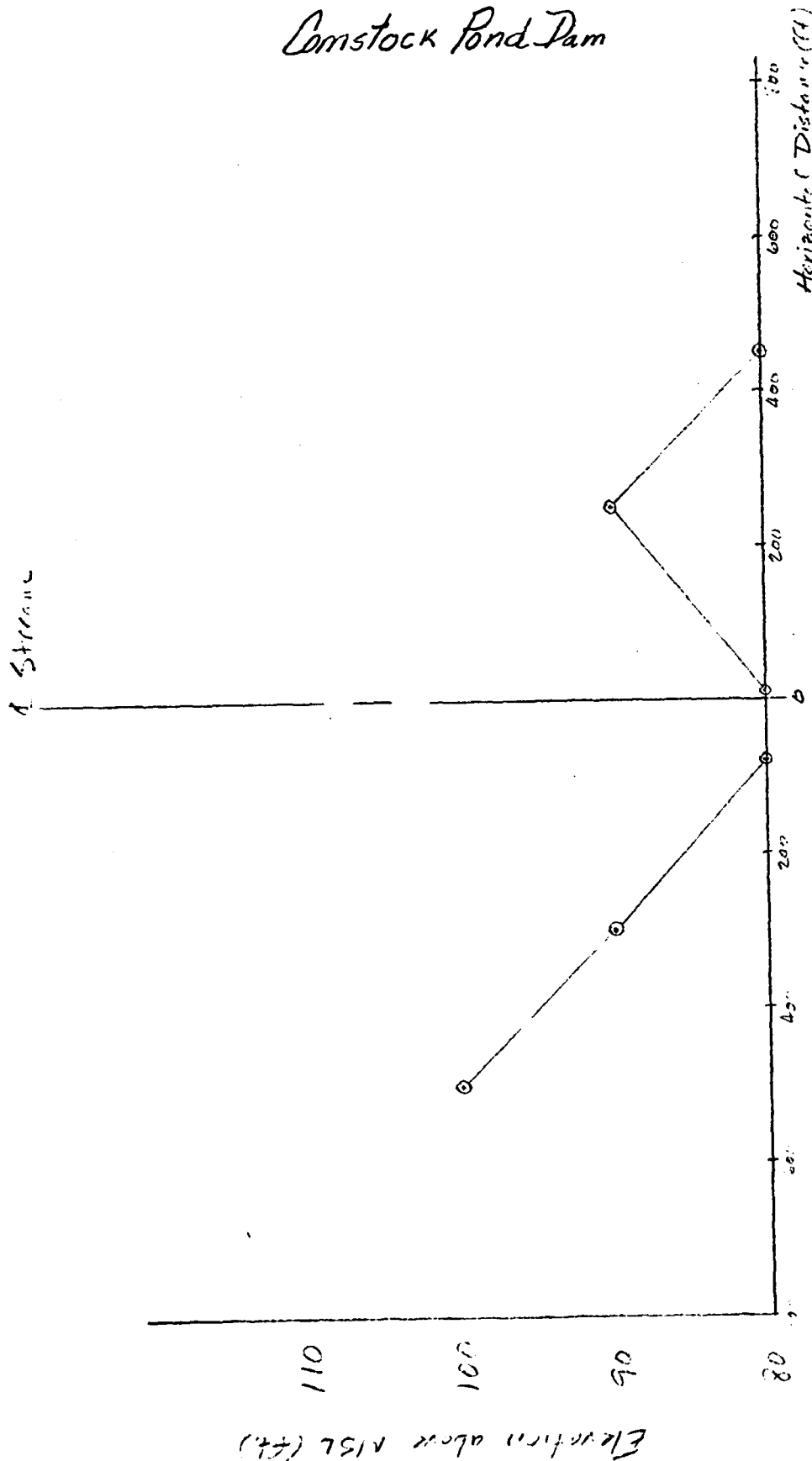
It appears as though a hazard potential of HIGH is posed by the potential failure of this dam. The street and houses directly in front of it would be washed out and flooding in the vicinity of the factory would create a high economic loss if not a loss in lives (the height of water would not be tremendous), before the water slowly moved out of the ponding region about 600' downstream.

PROJ. NO. 894109
DESCRIPTION Comstock Pond Dam
Essex, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D11 OF D14
BY TKL DATE 12/1/81
CHKD. BY WJB DATE 3/2/81

Comstock Pond Dam



LOOKING DOWNSTREAM
SECTION B-E

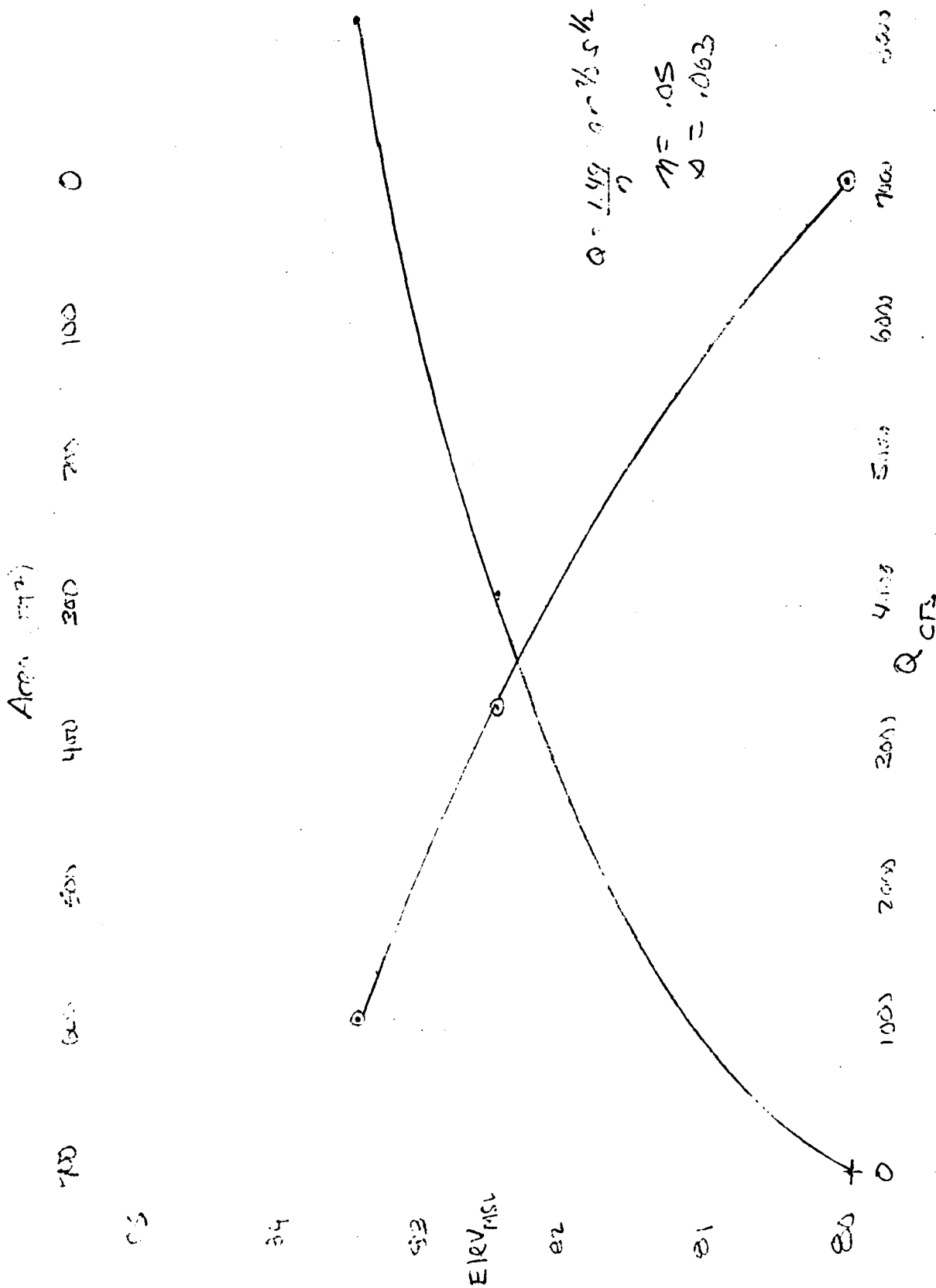
320 feet downstream of Section A-A
570 feet downstream of Comstock Pond Dam

PROJ. NO. BPH108
 DESCRIPTION Comstock Pond Dam
Excel, Conn.

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SHEET NO. D12 OF D14
 BY WJS DATE 2-27-81
 CHKD. BY _____ DATE _____

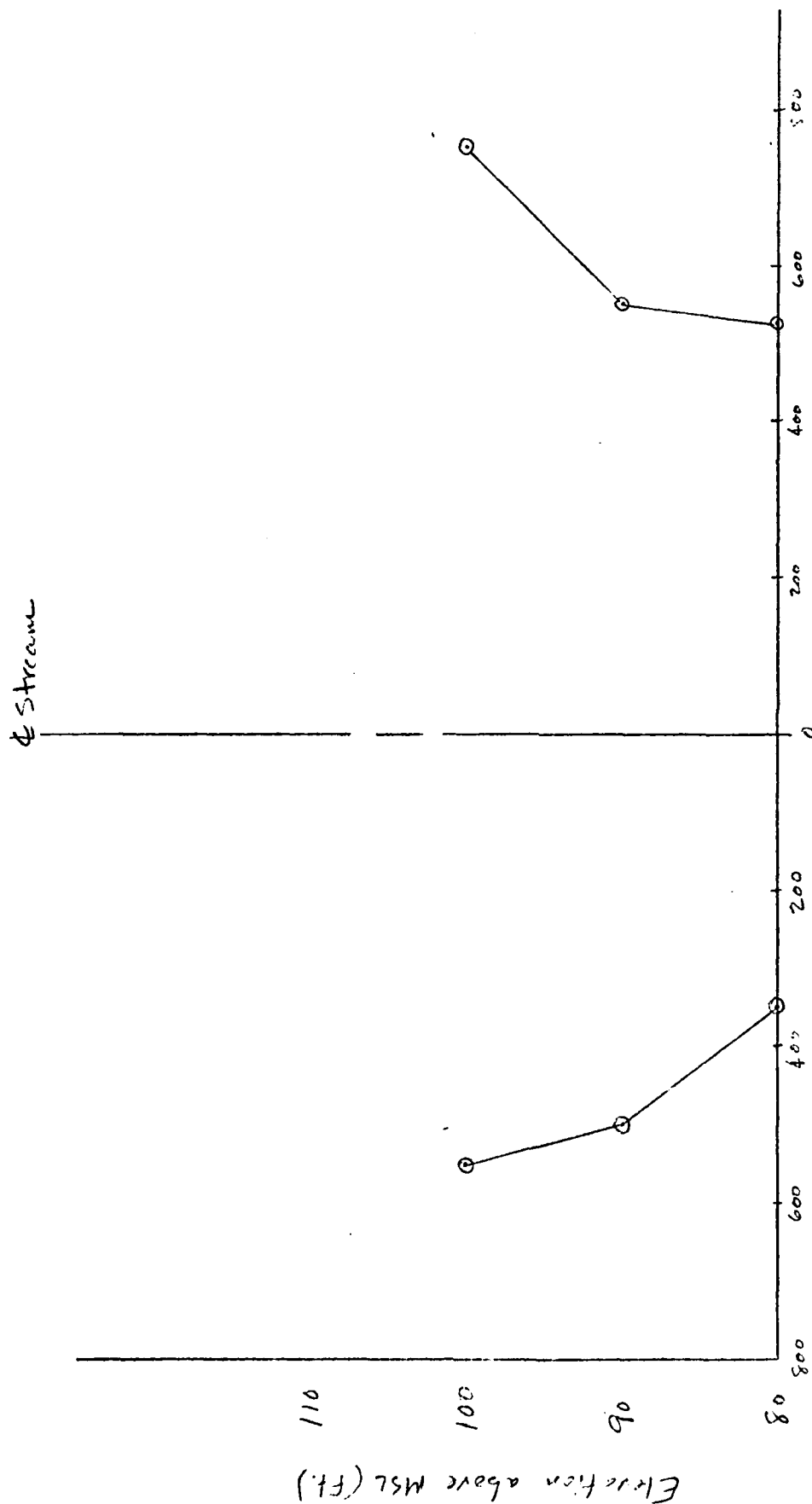
Comstock Pond Dam



PROJ. NO. 804108
DESCRIPTION Constock Pond Dam
Essex, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D13 OF D14
BY TKC DATE 12/15/20
CHKD. BY WJB DATE 3/2/21



LOOKING DOWNSTREAM

SECTION C-C

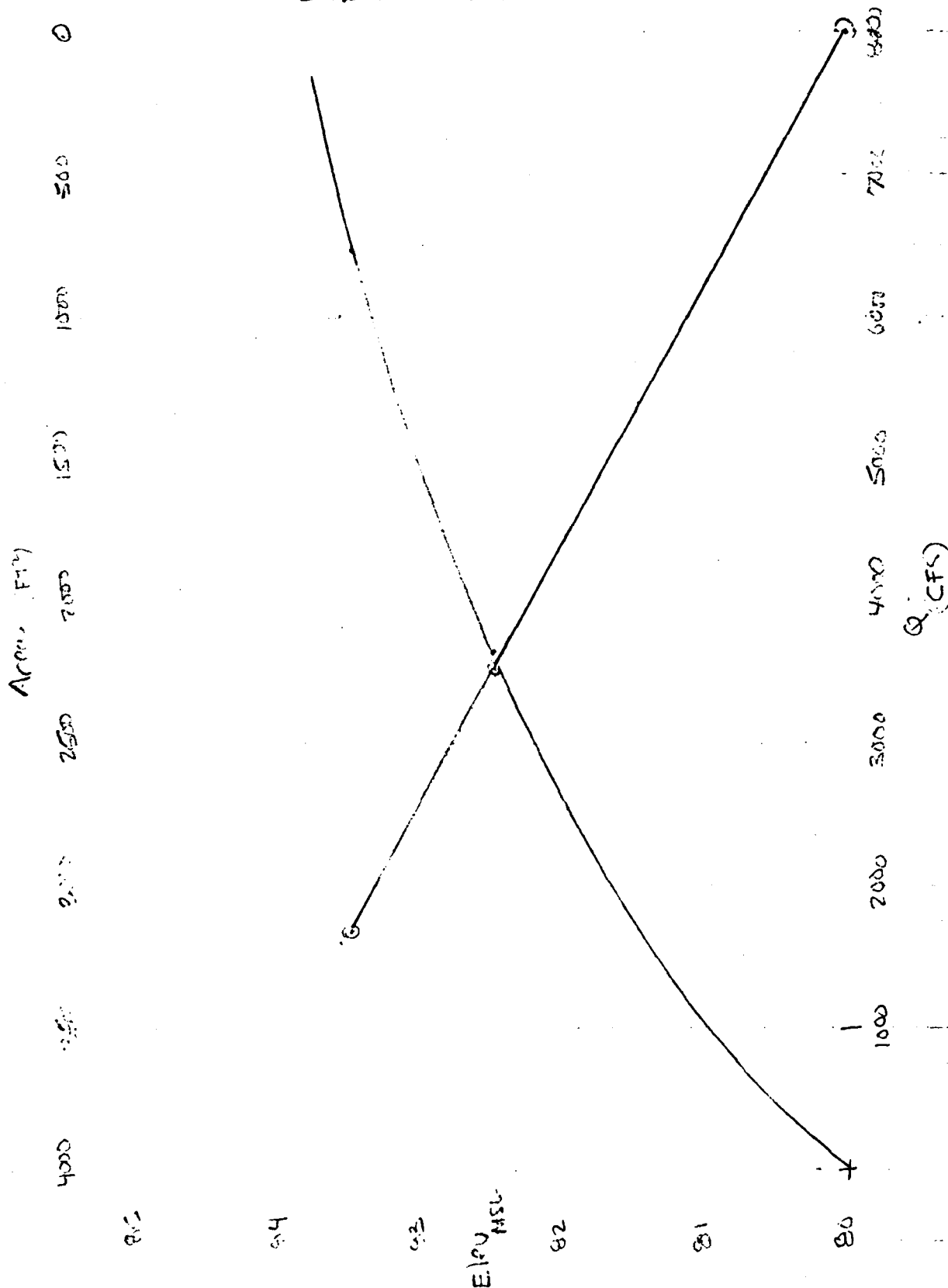
950 feet downstream of section B-B
1520 feet downstream of Constock Pond Dam

PROJ. NO. B04109
 DESCRIPTION Constock Pond Dam
Essex, Conn.

GENOVESE AND ASSOCIATES
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 HAMDEN, CONN.

SHEET NO. 014 OF 014
 BY WLB DATE 2-27-91
 CHKD. BY _____ DATE _____

Constock Pond Dam



Section C-C - Stage-Discharge - Area Curve

APPENDIX E

INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

FILMED

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DTIC